

WHAT IS CLAIMED IS:

1. A method for separating suspended clay fines from water in a clay slurry comprising:
 - injecting the clay slurry into a clay settling area at an introduction point; and
 - injecting, into the clay settling area at the introduction point, a polymeric flocculating agent, the polymeric flocculating agent causing clay fines in the clay slurry to flocculate and settle in the clay settling area, the flocculated clay sedimenting to form a thickened clay and a supernatant fluid in the clay settling area.
2. A method in accordance with claim 1, further comprising injecting dilution water directly into the clay settling area at the introduction point, the dilution water mixing with the clay slurry to form a dilute clay stream prior to discharging into the clay settling area.
3. A method in accordance with claim 2, wherein the dilution water comprises supernatant fluid extracted from the clay settling area.
4. A method in accordance with claim 2, further comprising:
 - measuring a flow rate of the dilute clay stream prior to discharging into the clay settling area;
 - measuring a percent solids of the dilute clay stream prior to discharging into the clay settling area; and
 - adjusting the volume of the dilution water based on the flow rate and the percent solids of the dilute clay stream to achieve a desired clay slurry density upon discharge into the clay settling area.
5. A method in accordance with claim 4, wherein the desired clay slurry density is between about 1% and about 1.25% total solids by weight.
6. A method in accordance with claim 1, wherein the step of injecting the polymeric flocculating agent includes:
 - mixing the polymeric flocculating agent with water to create a polymer solution; and
 - injecting the polymer solution into clay settling area at the introduction point.

7. A method in accordance with claim 6, wherein the step of injecting the polymer solution into the clay settling area is performed contemporaneously with the step of injecting the clay slurry into the clay settling area.
8. A method in accordance with claim 6, wherein the step of injecting the polymer solution into the clay settling area is performed subsequent to the step of injecting the clay slurry into the clay settling area.
9. A method in accordance with claim 1, wherein the step of injecting the polymeric flocculating agent includes injecting a dry chemical form of the polymeric flocculating agent directly into the clay settling area.
10. A method in accordance with claim 1, wherein the polymeric flocculating agent is a water soluble polymer formed from at least one ethylenically unsaturated monomer.
11. A method in accordance with claim 10, wherein the ethylenically unsaturated monomer is a monomer selected from the group consisting of:
 - an anionic monomer;
 - a non-anionic monomer; and
 - a cationic monomer.
12. A method in accordance with claim 10, wherein the ethylenically unsaturated monomer is selected from the group consisting of:
 - acrylic acid;
 - methacrylic acid;
 - 2-acrylamido-2-methylpropane sulfonic acid;
 - acrylamide;
 - dialkylaminoalkyl-methacrylates;
 - dialkylaminoalkyl-methacrylamides; and
 - diallyldimethylammonium chloride.

13. A method in accordance with claim 1 wherein the flocculating agent is a polymer selected from the group consisting of:
 - an anionic polymer;
 - a cationic polymer; and
 - a non-ionic polymer.
14. A method in accordance with claim 1 wherein the polymeric flocculating agent is an acrylamide-acrylic acid copolymer.
15. A method in accordance with claim 1, wherein the polymeric flocculating agent is a copolymer of sodium acrylate and acrylamide.
16. A method in accordance with claim 15, wherein a concentration of the polymeric flocculating agent is between about 0.2 to about 1.2 pounds of 100% polymer per ton of dry clay.
17. A method in accordance with claim 1, further comprising pumping the thickened clay from a bottom of the clay settling area at a point downstream of the introduction point.
18. A method in accordance with claim 17, further comprising transferring the thickened clay from the clay settling area into another clay settling area for further settling.
19. A method in accordance with claim 1, further comprising removing the supernatant fluid from a top layer of the clay settling area.
20. A method in accordance with claim 19, wherein the step of removing the supernatant fluid includes a step selected from the group consisting of:
 - pumping the supernatant fluid from a top layer of the clay settling area;
 - siphoning the supernatant fluid from a top layer of the clay settling area;
 - using a spillway to remove the supernatant fluid; and
 - using a weir to remove the supernatant fluid.

21. A method for separating suspended clay fines from water in a clay slurry comprising:

injecting the clay slurry into a clay settling area at an introduction point;

mixing a copolymer of sodium acrylate and acrylamide with water to form an initial polymer solution containing between about 0.2% to about 0.6% dry polymer in water;

injecting the initial polymer solution into a water stream to form a feed solution; and

injecting the feed solution into the clay settling area at the introduction point, the polymer in the feed solution causing clay fines in the clay slurry to flocculate and settle in the clay settling area, the flocculated clay sedimenting to form a thickened clay and a supernatant fluid in the clay settling area.